Manufacturers are welcome to present specific arguments regarding the frequency bands over which emissions should be investigated at the time the application for certification is submitted.

57. We agree with GM and Southwest Microwave that the measurement of conducted emissions above 40 GHz could accurately portray the radiated RF fields, provided the antenna characteristics can be accurately determined. However, we note that it is not always possible to obtain accurate antenna characteristics, especially at the frequencies of spurious emissions. Accordingly, we will permit conducted measurements to be employed in order to facilitate measurements. However, in cases of dispute we will rely on radiated measurement data to determine compliance. We note that radiated measurements are required for emissions below 40 GHz. Such measurements are necessary to ensure that emissions produced by incorporated digital circuitry and other lower frequency components are sufficiently attenuated so as not to become a source of harmful interference to lower frequency radio services.

58. We also agree with AAMA, GM and HP that emission limits above 40 GHz should be based on the use of measurement instrumentation employing an average detector. We note that the RF safety standards are based primarily on average RF levels. Accordingly, we are specifying the power density limits adopted in this proceeding as average limits to be measured using average detectors. We are concerned, however, that the use of certain modulation techniques and duty cycles could result in extremely high peak to average ratios which could cause interference to other systems. Further, high peak levels can have an effect on compliance with the RF safety hazards. We therefore are retaining our existing requirement in 47 CFR Section 15.35(b) that peak level emissions shall not exceed the maximum permitted average limits by more than 20 dB. We are also adopting our proposal to employ a 1 MHz resolution bandwidth for the measurement instrument.

59. Frequency Stability. In the Notice, we proposed to require that the fundamental emissions of millimeter wave devices must be contained within the frequency bands specified during all conditions of operation over the temperature range of -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of the rated voltage. Epsilon Lambda, HCP, and VORAD address this issue; all three support our proposal. We note that microwave transmitters, including millimeter wave devices, generally are more susceptible to changes in operating frequency due to fluctuations in temperature or voltage that are transmitters operating at lower frequencies. Accordingly, we are adopting the frequency stability requirements as proposed.

SECOND NOTICE OF PROPOSED RULE MAKING

60. In the Second Notice of Proposed Rule Making, we address three proposals: 1) restricting temporarily amateur use of the 76-77 GHz band while also giving amateurs co-primary status in the 77.5-78 GHz band; 2) requesting standards on spectrum etiquette techniques that should be implemented for general unlicensed operation in the 59-64 GHz

band; and, 3) establishing limits on the emissions from transmitters falling in the 200-231 GHz band.

61. Amateur Services. We recognize that amateurs would like to maintain their access to the 76-77 GHz band.[69] However, as discussed above, we believe that it is important that we protect vehicle radar systems from potential interference by restricting use of the 76-77 GHz band to such systems until sharing criteria can be established. Given the limited use of the 76-77 GHz band by amateurs and the availability of the 75.5-76.0 GHz and 77-81 GHz bands for amateur use, we believe that such a modification of our rules will not significantly harm amateur services. We also believe that any inconvenience to amateurs from restricting amateur use of the 76-77 GHz band will be minor and is outweighed by the potential interference problems and related safety concerns noted in the comments. We further believe that such a restriction would be appropriate until such time as it is established that the amateur operators will not cause interference to vehicle radar systems that would compromise public safety. Accordingly, we propose to amend Part 97 of our rules to temporarily disallow amateur use of the 76-77 GHz band. This restriction could be removed at a future time if we are convinced by the material submitted for the record that the safety of vehicle radar systems will not be compromised from other in-band transmissions or if we receive specific sharing recommendation guidelines that do not compromise safety. We intend to revisit within five years the issue of whether the 76-77 GHz band can be shared with amateur radio operators or other users. If it were to become apparent that particular types of radio services or devices will not interfere with vehicle radar systems or if adequate sharing criteria can be established, the restriction can be relaxed.

62. Although we do not believe that any significant harm will be caused to the Amateur Radio Service operators by disallowing their use of the 76-77 GHz band, we are also proposing to amend Part 2 of our rules to upgrade the status of the Amateur Radio Service in the 77.5-78 GHz band from secondary to co-primary with the Government and non-Government radiolocation services. This will ensure that amateur access to spectrum near 77 GHz is maintained without the threat of preemption by higher priority services. We believe that these proposals balance the need to protect vehicle radar systems from interference with the our desire to foster amateur experimentation using millimeter wave technology.

63. Spectrum Etiquette. In the comments, Apple, AT&T, HP, HCP, Sun Microsystems Computer Company, and Tetherless Access Ltd. recommend that we undertake the establishment of a spectrum etiquette to protect against interference between general unlicensed devices. They also request that we direct industry to form an working group to design such an etiquette for the general unlicensed millimeter wave band, and to demonstrate

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[69] According to the ARRL's comments, amateur use of the 76-77 GHz band is not significant at the present time.

its efficacy to the Commission.[70]

64. In general, we have not required spectrum etiquettes for unlicensed transmitters, believing that they were unnecessary and could restrict the development of new technology. However, in adopting rules for unlicensed Personal Communications Services (PCS) devices, we did require a spectrum etiquette to ensure that the spectrum is used more effectively and efficiently.[71] It is not clear at this time that such an etiquette is necessary for the 59-64 GHz band. However, recognizing the desires of the commenting parties to consider implementing a system etiquette requirement in the rules, we are delaying our implementation of the rules permitting unlicensed use of the 59-64 GHz band for one year to permit industry to develop the standards.[72] Accordingly, we request comments on the need for a spectrum etiquette standard to prevent interference among unlicensed 59-64 GHz devices, analogous to the standard used for unlicensed PCS under Part 15 of our rules, and specific proposals for such standards.[73] We also request comments on whether, if we adopt a spectrum etiquette standard for the 59-64 GHz band, it might also be desirable to allow the use of other etiquettes under conditions where the devices would not be likely to interfere with equipment employing the adopted etiquette standard. Interested parties are urged to work together to develop a proposal for a spectrum etiquette standard for the 59-64 GHz band. However, commenters should note that we do not intend to delay implementation of the 59-64 GHz band for an extensive period of time. If industry can agree to a specific spectrum etiquette standard within the one year provided for this purpose, we will provide an additional delay of the rules permitting unlicensed use of the 59-64 GHz band to implement the spectrum etiquette standard through a subsequent Notice of Proposed Rule Making. If, however, industry can not agree upon a specific standard or if comments indicate that such an etiquette is

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[70] See Letter from Apple, HCP, AT&T, Sun Microsystems Computer Company, HP, and Tetherless Access Ltd. dated August 7, 1995.

[71] See Second Report and Order in GEN Docket No. 90-314, 8 FCC Rcd 7700 (1993). See, also, Memorandum Opinion and Order in GEN Docket No. 90-314, 9 FCC Rcd 5947 (1994).

[72] We note that systems designed to operate at the maximum power density level for 59-64 GHz devices would normally employ directional antennas with narrow beamwidths, limiting the area over which interference could be caused. In addition, the low operating power of general unlicensed devices will reduce transmission range, permitting a higher concentration of transmitters to be located in a geographical area while also reducing the potential for interference. Thus, it appears that the major potential for harmful interference will be intra-system. Large concentrations of 59-64 GHz transmitters would likely be part of a commercial/industrial system that is professionally installed and engineered to function as a system. Accordingly, manufacturers might wish to design their own spectrum etiquette approaches to prevent interference within these systems.

[73] See 47 CFR 15.321 and 15.323.

inappropriate, we intend to implement the standards adopted herein without a spectrum etiquette standard.

65. Emissions Above 200 GHz. Finally, we are concerned about potential harmful interference to radio astronomy operations in the band 217-231 GHz.[74] In the Notice in this proceeding, we only proposed to specify out-of-band limits, and require the measurement of emissions, up to 200 GHz. Thus, further notice and opportunity for comment is necessary before emission limits above 200 GHz can be implemented.[75] We therefore are proposing to apply a power density limit of 1000 pW/cm^2 at 3 meters to emissions between 200 GHz and 231 GHz. This is the limit recommended by NTIA to prevent interference to radio astronomy operations in the 217-231 GHz band.[76] We recognize that this proposal may impose additional costs, especially on the manufacturers of vehicle radars in the 76-77 GHz band, but believe in this early stage of development of the millimeter wave bands that we should err on the side of caution. We invite comments on the application of this proposed spurious emission limit for all millimeter wave systems. We also request comments on whether the limits on spurious emissions should be extended only to cover the radio astronomy band at 217-231 GHz instead of the entire 200-231 GHz band. In addition, comments are requested on whether emission limits above 200 GHz should apply to all millimeter wave transmitters or only to vehicle radar systems operating in the 76-77 GHz band since the third harmonic of 76-77 GHz vehicle radar systems falls within 228-231 GHz. Finally, we request comments on whether it might be possible, instead, to allow vehicle radar manufacturers to avoid such limits by demonstrating, in collaboration with NTIA and radio astronomy users, that there would be a low probability of interference because of the angular distribution of the vehicle radar system and the susceptibility of radio astronomy equipment to off-axis signals.

PROCEDURAL MATTERS

66. This is a non-restricted notice and comment rule making proceeding. Ex parte presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in the Commission's rules. See generally 47 CFR Sections 1.1202, 1.1203, and 1.1206(a).

67. Regulatory Flexibility Analysis. The Final Regulatory Flexibility Analysis for the Report and Order, required by the Regulatory Flexibility Act of 1980, 5 U.S.C. 608, is

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[74] The third harmonic of transmitters operating in the 76-77 GHz band falls within the band 228-231 GHz. Further, we note that the third order harmonic can be particularly high in amplitude, depending on the design of the equipment.

[75] See 5 USC 553.

[76] See letter of November 2, 1995, from Richard D. Parlow of NTIA to Richard M. Smith.

contained in Appendix A. As required by Section 603 of the Regulatory Flexibility Act, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the expected impact on small entities of the proposals suggested in the Second Notice of Proposed Rule Making. The IRFA is set forth in Appendix B. Written public comments are requested on the IRFA. These comments must be filed in accordance with the same filing deadlines as comments on the rest of the Notice, but they must have a separate and distinct heading designating them as responses to the Initial Regulatory Flexibility Analysis. The Secretary shall send a copy of this Second Notice of Proposed Rule Making, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration in accordance with paragraph 603(a) of the Regulatory Flexibility Act. Pub. L. No. 96-354, 94 Stat. 1164, 5 U.S.C. Section 601 et seq (1981).

68. Initial Paperwork Reduction Act of 1995 Analysis. This Report and Order and Second Notice of Proposed Rule Making contains either a proposed or modified information collection. As part of its continuing effort to reduce paperwork burdens, we invite the general public and the Office of Management and Budget (OMB) to take this opportunity to comment on the information collections contained in this NPRM, as required by the Paperwork Reduction Act of 1995, Pub. L. No. 104-13. Public and agency comments are due at the same time as other comments on this NPRM; OMB comments are due 60 days from date of publication of this NPRM in the Federal Register. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and, (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

69. Comment Dates. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. Sections 1.415 and 1.419, interested parties may file comment on the Second Notice of Proposed Rule Making on or before **[insert date 60 days from date of publication in the Federal Register]** and reply comments on or before **[insert date 90 days from date of publication in the Federal Register]**. To file formally in this proceeding, you must file an original and five copies of all comments, reply comments, and supporting comments. If you want each Commissioner to receive a personal copy of your comments, you must file an original plus nine copies. You should send comments and reply comments to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. You may also file comments electronically via the Internet at mmwaves@fcc.gov. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center of the Federal Communications Commission, Room 239, 1919 M Street, N.W., Washington, D.C. 20554. Written comments by the public on the proposed and/or modified information collections are due **[insert date 60 days from date of publication in the Federal Register]**. Written comments must be submitted by the Office of Management and Budget (OMB) on the proposed and/or modified information collections on or before **[insert date 60 days from date of publication in the**

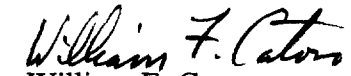
Federal Register]. In addition to filing comments with the Secretary, a copy of any comments on the information collections contained herein should be submitted to Dorothy Conway, Federal Communications Commission, Room 234, 1919 M Street, N.W., Washington, DC 20554, or via the Internet to dconway@fcc.gov and to Timothy Fain, OMB Desk Officer, 10236 NEOB, 725 - 17th Street, N.W., Washington, DC 20503 or via the Internet to fain_t@al.eop.gov.

ORDERING CLAUSES

70. IT IS ORDERED that Parts 2 and 15 of the Commission's Rules and Regulations ARE AMENDED as specified in Appendix D, effective 30 days after publication in the Federal Register and upon clearance from the Office of Management and Budget on the information collection requirements, whichever is the later date. Authority for issuance of this Report and Order and Second Notice of Proposed Rule Making is contained in Sections 4(i), 301, 302, 303(e), 303(f), 303(g), 303(r), 304 and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 301, 302, 303(e), 303(f), 303(g), 303(r), 304 and 307.

71. For further information regarding this proceeding, please send an electronic mail message via the Internet to mmwaves@fcc.gov, or contact John Reed, Office of Engineering and Technology, (202) 418-2455, Richard Engelman, Office of Engineering and Technology, (202) 418-2445, or Michael Marcus, Office of Engineering and Technology, (202) 418-2470.

FEDERAL COMMUNICATIONS COMMISSION



William F. Caton
Acting Secretary

APPENDIX A

FINAL REGULATORY FLEXIBILITY ANALYSIS FOR R&O

1. Need and purpose of this action: This Report and Order makes available the frequency bands 46.7-46.9 GHz and 76-77 GHz for unlicensed operation under Part 15 for use as vehicle radar systems. This order also makes available the band 59-64 GHz for general purpose unlicensed operation under Part 15.

2. Summary of the issues raised by the public comments in response to the Initial Regulatory Flexibility Analysis: There were no comments submitted in response to the Initial Regulatory Flexibility Analysis.

3. Significant alternatives considered: In general, the commenters in this proceeding supported establishing the described spectrum for vehicle radars and for general purpose applications. While the Notice of Proposed Rule Making proposed to make the band 47.2-47.4 GHz available for vehicle radar systems, the comments persuaded us to move this frequency band to 46.7-46.9 GHz. Other commenters suggested alternative uses for the 59-64 GHz band, including licensed, high-power applications. However, these suggestions were denied in order to provide sufficient bandwidth to support extremely high speed data distribution systems that could be operated without the need to obtain a license from the Commission. Finally, while several other frequency bands were also proposed in this proceeding, action on these other proposals is being delayed to permit operations that generated the greatest interest at the earliest possible time. Based on its analysis of the comments in this proceeding, the Commission determined that the action taken in this Report and Order would provide the most beneficial use of the spectrum under consideration.

APPENDIX B

INITIAL REGULATORY FLEXIBILITY ANALYSIS FOR 2ND NPRM

Reason for Action

This rule making proceeding is initiated to obtain comment regarding proposed changes to the regulations for temporarily restricting amateur use of the 76-77 GHz band, giving amateurs co-primary status in the 77.5-78 GHz band, requesting standards on spectrum etiquette techniques that should be implemented for general unlicensed operation in the 59-64 GHz band, and establishing a limit on spurious emissions from millimeter wave transmitters in the 200-231 GHz band.

Objectives

The Commission seeks to determine if the standards should be amended to minimize interference to vehicle radar systems and to minimize interference from vehicle radar systems to radio astronomy and other operations. We also seek to determine spectrum etiquette techniques that should be employed to minimize interference between transmission systems operating in the 59-64 GHz band.

Legal Basis

The proposed action is authorized under Sections 4(i), 301, 302, 303(e), 303(f), 303(g), 303(r), 304 and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 301, 302, 303(e), 303(f), 303(g), 303(r), 304 and 307.

Reporting, Recordkeeping and Other Compliance Requirements

Radio astronomy operations in the band 217-231 GHz are currently protected from harmful interference in accordance with U.S. Footnotes US74 and US246, as described in 47 CFR Sections 2.105 and 2.106. There is concern that the third harmonic spurious emissions from transmitters operating in the band 76-77 GHz may cause interference to these radio astronomy operations. Thus, we propose to limit the level of emissions between 200-231 GHz. We also propose to establish spectrum etiquette techniques to would apply to, and minimize interference between, systems operating in the band 59-64 GHz. Measurements of these emission levels and spectrum etiquette techniques would be reported to the Commission as part of the normal equipment authorization process under our certification procedure.

Federal Rules Which Overlap, Duplicate or Conflict With These Rules

None.

Description, Potential Impact and Number of Small Entities Involved

The technology to permit operation in these high frequency bands is immature at the present time. It may be some time before this technology reaches a point under which products can be economically produced so as to achieve any substantial consumer demand. Thus, no estimate is available on the potential number of manufacturers that could be impacted from these rules. We expect that most of the automotive industry will become involved in the manufacture of transmitters in the 76-77 GHz band. We also expect that several manufacturers eventually will become involved in the manufacture of transmitters in the 59-64 GHz band for high speed computer-to-computer transmission systems. Finally, we recognize that the temporary elimination of the 76-77 GHz band for amateur use could cause some impact. However, at the present time the amount of amateur usage in this band is extremely light. In addition, we propose to offset any perceived harm to the amateur operators that would occur from the removal of this spectrum by providing amateur operators with a co-primary status in the band 77.5-78 GHz.

Any Significant Alternatives Minimizing the Impact on Small Entities Consistent with Stated Objectives

None.

APPENDIX C: RESPONDENTS

Comments in ET Docket No. 94-124

Alcatel Network Systems, Inc. (ANS)
American Automobile Manufacturers Association (AAMA)
American Council on Education, American Association of Community Colleges, California State University, Sacramento, Education Network of Maine, State of Wisconsin Educational Communications Board, and University of Wisconsin System (Educational Parties)
American Radio Relay League, Inc. (ARRL)
Apple Computer, Inc. (Apple)
Association for Promotion of Millimeter-Wave Development and Utilization (APMDU)
AT&T Corp. (AT&T)
Avant-Garde Telecommunications, Inc.
CellularVision
Clarendon Foundation (Clarendon)
ComTech Associates, Inc. (ComTech)
Endgate Technology Corporation
Epsilon Lambda Electronics Corp. (Epsilon Lambda)
Fujitsu Limited
Fujitsu Ten Limited
GE American Communications, Inc.
General Motors Corporation and GM Hughes Electronics (GM)
General Motors Corporation, North American Operations
GHz Equipment Co., Inc. (GEC)
Harris Corporation-Farinon Division (Harris)
Hewlett-Packard Co. (HP)
Honda R&D Ltd. and Honda R&D North America, Inc. (Honda)
Hughes Aircraft Company, Communications Products Business Unit (HCP)
Hughes Communications Galaxy, Inc.
Lockheed Sanders, Inc.
Martin Marietta Corporation (Martin Marietta)
Metricom, Inc. (Metricom)
Millimeter Wave Advisory Group (mmWAG)
Mitsubishi Electric Corporation
National Aeronautics and Space Administration (NASA)
National Academy of Sciences, Committee on Radio Frequencies of the National Research Council (CORF)
National Telecommunications and Information Administration (NTIA)
Pacific Bell Mobile Service and Telesis Technologies Laboratory (Pacific)
Rand McNally & Company (RMC)
Research & Development Center for Radio Systems (RCR)
Rockwell International Corporation (Rockwell)

Southwest Microwave, Inc.
Telecommunications Industry Association, Fixed Point-to-Point Communications Section, Network Equipment Division (TIA)
Teledesic Corporation (Teledesic)
Texas Instruments, Inc.
Troy State University in Montgomery
TRW Inc. (TRW)
UTC
VORAD Safety Systems, Inc. (VORAD)

Reply Comments in ET Docket No. 94-124

AEL Industries, Inc.
Alcatel Network Systems, Inc. (ANS)
American Automobile Manufacturers Association (AAMA)
American Radio Relay League, Inc. (ARRL)
Ameritech
Apple Computer, Inc. (Apple)
Association for Promotion of Millimeter-Wave Development and Utilization (APMDU)
Association of American Railroads (AAR)
Association of America's Public Television Stations (APTS)
AT&T Corp. (AT&T)
Bell Atlantic
CellularVision
Comtech Associates, Inc. (ComTech)
Digital Microwave Corporation (DMC)
Dudley Lab
Ford Motor Company (Ford)
GE American Communications, Inc.
General Motors Corporation and GM Hughes Electronics (GM)
Harris Corporation-Farinon Division (Harris)
Hewlett-Packard Co. (HP)
Hughes Aircraft Company, Communications Products Business Unit (HCP)
Hughes Communications Galaxy, Inc.
Hughes Electron Dynamics Division
Intelligent Transportation Society of America (ITS America)
M/A-COM, Inc.
mm-Tech, Inc.
Millimeter Wave Advisory Group (mmWAG)
Minority Media and Telecommunications Council (MMTC)
Motorola Satellite Communications, Inc. (Motorola)
National Aeronautics and Space Administration (NASA)
National Rural Telecommunications Cooperative (NRTC)

Pacific Telesis Enhanced Services, Pacific Bell Mobile Service, and Telesis Technology Laboratory (Pacific)
Telecommunications Industry Association, Fixed Point-to-Point Communications Section, Network Equipment Division (TIA)
Teledesic Corporation (Teledesic)
Texas Instruments, Inc.
Titan Information Systems Corporation
Toyota Motor Corporation (Toyota)
Troy State University in Montgomery
TRW Inc. (TRW)
UK Radiocommunications Agency
U.S. Department of Transportation, Federal Highway Administration (FHA)
Video/Phone Systems, Inc. (Video/Phone)
VORAD Safety Systems, Inc. (VORAD)
Western Cooperative for Educational Telecommunications

APPENDIX D: FINAL RULES

A. Title 47 of the Code of Federal Regulations, Part 2, is amended as follows:

PART 2 - FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: Sec. 4, 302, 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, and 307, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended by revising columns 1, 4, 5, and 6 for the frequency bands 43.5-47.0 GHz, 59-64 GHz, 76-81 GHz, to read as follows:

Section 2.106 Table of Frequency Allocations.

* * * * *

International table			United States table		FCC use designators	
Region 1 -- allocation GHz	Region 2 -- allocation GHz	Region 3 -- allocation GHz	Government	Non-Government	Rule part(s)	Special-use frequencies
			Allocation GHz	Allocation GHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)

* * * * *

43.5-45.5 MOBILE 902 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 903	43.5-45.5 MOBILE 902 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 903	43.5-45.5 MOBILE 902 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 903	43.5-45.5 FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) G117	43.5-45.5		
45.5-47.0 MOBILE 902 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 903	45.5-47.0 MOBILE 902 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 903	45.5-47.0 MOBILE 902 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE 	45.5-47.0 MOBILE MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION RADIONAVIGATION-SATELLITE 903	45.5-47.0 MOBILE MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION RADIONAVIGATION-SATELLITE 903	RADIO FREQUENCY DEVICES (15)	

* * * * *

International table			United States table		FCC use designators	
Region 1 -- allocation GHz	Region 2 -- allocation GHz	Region 3 -- allocation GHz	Government	Non-Government	Rule part(s)	Special-use frequencies
			Allocation GHz	Allocation GHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
* * * * *						
59-64 FIXED INTER-SATELLITE MOBILE 909 RADIOLOCATION 910 911	59-64 FIXED INTER-SATELLITE MOBILE 909 RADIOLOCATION 910 911	59-64 FIXED INTER-SATELLITE MOBILE 909 RADIOLOCATION 910 911	59-64 FIXED INTER-SATELLITE MOBILE 909 RADIOLOCATION 910 911	59-64 FIXED INTER-SATELLITE MOBILE 909 RADIOLOCATION 910 911	Radio frequency devices (15)	61.25 GHz ± 250 MHz: Industrial, scientific and medical frequency
* * * * *						
76-77 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	76-77 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	76-77 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	76-77 RADIOLOCATION	76-77 RADIOLOCATION Amateur	RADIO FREQUENCY DEVICES (15)	
77-81 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77-81 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77-81 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77-81 912	77-81 RADIOLOCATION Amateur Amateur-Satellite 912	Amateur (97)	
* * * * *						

3. Section 2.997 is amended to read as follows:

Section 2.997 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Sections 2.991 and 2.993 of this Part, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:

(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(2) If the equipment operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the equipment operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower.

(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

B. Title 47 of the Code of Federal Regulation, Part 15, is amended as follows:

PART 15 - RADIO FREQUENCY DEVICES

1. The authority citation for Part 15 continues to read as follows:

AUTHORITY: Secs. 4, 302, 303, 304, 307, and 624A of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, 304, 307, and 544A.

2. Section 15.31 is amended by revising paragraph (f)(1) to read as follows:

Section 15.31 Measurement standards.

* * * * *

(f) * * *

(1) At frequencies equal to or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field; and, it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than what is specified, the results shall be extrapolated to the specified distance using one of the following formulas: for measurements above 30 MHz but below 40 GHz, an inverse linear-distance extrapolation factor (20 dB/decade); for measurements above 40 GHz, an inverse linear-distance-squared extrapolation factor (40 dB/decade).

* * * * *

3. Section 15.33 is amended by revising paragraph (a) to read as follows:

Section 15.33 Frequency range of radiated measurements.

(a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown below:

(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

(3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower.

(4) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a)(1)-(a)(3) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this Section, whichever is the higher frequency range of investigation.

* * * * *

4. Section 15.35 is amended by revising paragraph (b) to read as follows:

Section 15.35 Measurement detector functions and bandwidth.

* * * * *

(b) On any frequency or frequencies above 1000 MHz, unless otherwise stated, the radiated limits shown are based on the use of measurement instrumentation employing an average detector function. When average radiated emission measurements are specified in the regulations, including emission measurements below 1000 MHz, there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. Measurements of AC power line conducted emissions are performed using a CISPR quasi-peak detector, even for devices for which average radiated emission measurements are specified.

* * * * *

5. Section 15.205 is amended by adding a new paragraph (d)(4) to read as follows:

Section 15.205 Restricted bands of operation.

* * * * *

(d)(4) Any equipment operated under the provisions of Section 15.253 or Section 15.255 of this Part.

* * * * *

6. A new Section 15.253 is added to read as follows:

Section 15.253 Operation within the bands 46.7-46.9 GHz and 76.0-77.0 GHz.

(a) Operation within the bands 46.7-46.9 GHz and 76.0-77.0 GHz is restricted to vehicle-mounted field disturbance sensors used as vehicle radar systems. The transmission of additional information, such as data, is permitted provided the primary mode of operation is as a vehicle-mounted field disturbance sensor. Operation under the provisions of this section is not permitted on aircraft or satellites.

(b) The radiated emission limits within the bands 46.7-46.9 GHz and 76.0-77.0 GHz are as follows:

(1) If the vehicle is not in motion, the power density of any emission within the bands specified in this section shall not exceed 200 nW/cm^2 at a distance of 3 meters from the exterior surface of the radiating structure.

(2) For forward-looking vehicle-mounted field disturbance sensors, if the vehicle is in motion the power density of any emission within the bands specified in this section shall not exceed 60 $\mu W/cm^2$ at a distance of 3 meters from the exterior surface of the radiating structure.

(3) For side-looking or rear-looking vehicle-mounted field disturbance sensors, if the vehicle is in motion the power density of any emission within the bands specified in this section shall not exceed 30 $\mu W/cm^2$ at a distance of 3 meters from the exterior surface of the radiating structure.

(c) The power density of any emissions outside the operating band shall consist solely of spurious emissions and shall not exceed the following:

(1) For vehicle-mounted field disturbance sensors operating in the band 46.7-46.9 GHz: 2 pW/cm^2 at a distance of 3 meters from the exterior surface of the radiating structure.

(2) For forward-looking vehicle-mounted field disturbance sensors operating in the band 76-77 GHz: 600 pW/cm^2 at a distance of 3 meters from the exterior surface of the radiating structure.

(3) For side-looking or rear-looking vehicle-mounted field disturbance sensors operating in the band 76-77 GHz: 300 pW/cm^2 at a distance of 3 meters from the exterior surface of the radiating structure.

(4) Radiated emissions below 40 GHz shall not exceed the general limits in Section 15.209 of this part.

(d) The provisions in Section 15.35 of this part limiting peak emissions apply.

(e) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

(f) Regardless of the power density levels permitted under this section, devices operating under the provisions of this section must comply with the requirements of the RF safety standards specified in Section 1.1307(b) of this chapter. Compliance with these standards for the fundamental emissions and the unwanted emissions must be demonstrated in the application for certification.

7. A new Section 15.255 is added to read as follows:

Section 15.255 Operation within the band 59.0-64.0 GHz.

NOTE: Equipment may not be operated under the provisions of this section until a final Commission decision is reached concerning appropriate spectrum etiquette techniques.

(a) Operation under the provisions of this section is not permitted for field disturbance sensors, including vehicle radar systems, nor is the operation of this equipment permitted on aircraft or satellites.

(b) Within the 59.0-64.0 GHz band, the power density of any emission shall not exceed 9 $\mu W/cm^2$ at a distance of 3 meters.

(c) The power density of any emissions outside the 59.0-64.0 GHz band shall consist solely of spurious emissions and shall not exceed 90 pW/cm^2 at a distance of 3 meters. The levels of the spurious emissions shall not exceed the level of the fundamental emission.

(d) Radiated emissions below 40 GHz shall not exceed the general limits in Section 15.209 of this part.

(e) The provisions in Section 15.35 limiting peak emissions apply.

(f) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

(g) Regardless of the power density levels permitted under this section, devices operating under the provisions of this section must comply with the requirements of the RF safety standards specified in Section 1.1307(b) of this chapter. Compliance with these standards for the fundamental emissions and the unwanted emissions must be demonstrated in the application for certification. The use of professional installation to install the equipment is not sufficient to provide this demonstration.

APPENDIX E - PROPOSED RULES

A. Title 47 of the Code of Federal Regulations, Part 2, is amended as follows:

1. The authority citation for Part 2 continues to read as follows:

AUTHORITY: Sec. 4, 302, 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, and 307, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended by revising columns 5 and 6 for the frequency band 76-81 GHz to read as follows:

Section 2.106 Table of Frequency Allocations.

* * * * *

International table			United States table		FCC use designators	
Region 1 -- allocation GHz	Region 2 -- allocation GHz	Region 3 -- allocation GHz	Government	Non-Government	Rule part(s)	Special-use frequencies
			Allocation GHz	Allocation GHz		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
* * * * *						
76-77 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	76-77 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	76-77 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	76-77 RADIOLOCATION	76-77 RADIOLOCATION Amateur	RADIO FREQUENCY DEVICES (15)	
77-77.5 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77-77.5 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77-77.5 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77-77.5 RADIOLOCATION	77-77.5 RADIOLOCATION Amateur Amateur-Satellite	Amateur (97)	
77.5-78 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77.5-78 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77.5-78 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	77.5-78 RADIOLOCATION	77.5-78 RADIOLOCATION AMATEUR AMATEUR-SATELLITE	AMATEUR (97)	
78-81 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	78-81 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	78-81 RADIOLOCATION Amateur Amateur-Satellite Space Research (space-to-Earth)	78-81 RADIOLOCATION 912	78-81 RADIOLOCATION Amateur Amateur-Satellite 912	Amateur (97)	
* * * * *						

B. Title 47 of the Code of Federal Regulations, Part 15, is amended as follows:

PART 15 - RADIO FREQUENCY DEVICES

1. The authority citation for Part 15 continues to read as follows:

AUTHORITY: Secs. 4, 302, 303, 304, 307, and 624A of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 302, 303, 304, 307, and 544A.

2. Section 15.33 is amended by revising paragraph (a)(3), to read as follows:

Section 15.33 Frequency range of radiated measurements.

* * * * *

(a)(3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 231 GHz, whichever is lower.

* * * * *

3. Section 15.253 is amended by redesignating paragraph (c)(4) as paragraph (c)(5) and by adding a new paragraph (c)(4), to read as follows:

Section 15.253 Operation within the bands 46.7-46.9 GHz and 76.0-77.0 GHz.

* * * * *

(c)(4) Above 200 GHz, the power density of any emission shall not exceed 1000 pW/cm^2 at a distance of 3 meters from the exterior surface of the radiating structure.

* * * * *

4. Section 15.255 is amended by revising paragraph (c) to read as follows:

Section 15.255 Operation within the band 59.0-64.0 GHz.

* * * * *

(c) The power density of any emissions outside the 59.0-64.0 GHz band shall consist solely of spurious emissions. Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters. Above 200 GHz, the level of these emissions shall not exceed 1000 pW/cm^2 at a distance of 3 meters. The levels of the spurious emissions shall not exceed the level of the fundamental emission.

C. Title 47 of the Code of Federal Regulations, Part 97, is amended as follows:

PART 97 - AMATEUR RADIO SERVICE

1. The authority citation for Part 97 continues to read as follows:

AUTHORITY: 48 Stat. 1066, 1082, as amended; 47 U.S.C. 154, 303. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. 151-155, 301-609, unless otherwise noted.

2. Section 97.301, Authorized frequency bands, is amended by revising paragraph (a) for the wavelength band 4 mm to read as follows:

§ 97.301 Authorized frequency bands.

* * * * *

(a) * * *

Wavelength band	ITU - Region 1	ITU - Region 2	ITU - Region 3	Sharing requirements see § 97.303 (Paragraph)
		* * * * *		
EHF	GHz	GHz	GHz	
*	*	*	*	*
4 mm	75.5-81.0.....	75.5-81.0.....	75.5-81.0.....	(b), (c), (h), (r).
*	*	*	*	*

* * * * *

3. Section 97.303 is amended by revising paragraphs (b), (c) and (h) and by adding a new paragraph (r), to read as follows:

§ 97.303 Frequency sharing requirements.

* * * * *

(b) No amateur station transmitting in the 1900-2000 kHz segment, the 70 cm band, the 33 cm band, the 13 cm band, the 9 cm band, the 5 cm band, the 3 cm band, the

24.05-24.25 GHz segment, the 77.0-77.5 GHz segment, the 78-81 GHz segment, the 144-149 GHz segment, and the 241-248 GHz segment shall cause harmful interference to, nor is protected from interference due to the operation of, the Government radiolocation service.

(c) No amateur station transmitting in the 1900-2000 kHz segment, the 3 cm band, the 77.0-77.5 GHz segment, the 78-81 GHz segment, the 144-149 GHz segment, and the 241-248 GHz segment shall cause harmful interference to, nor is protected from interference due to the operation of, stations in the non-Government radiolocation service.

* * * * *

(h) No amateur station transmitting in the 23 cm band, the 3 cm band, the 24.05-24.25 GHz segment, the 77-77.5 GHz segment, the 78-81 GHz segment, the 144-149 GHz segment, and the 241-248 GHz segment shall cause harmful interference to, nor is protected from interference due to the operation of, stations authorized by other nations in the radiolocation service.

* * * * *

(r) In the 4 mm band:

(1) Amateur use of the 76-77 GHz band is suspended until such time that the Commission may determine that amateur use of this band will not interfere with vehicle radar and thereby pose a safety threat.

(2) In places where the amateur service is regulated by the FCC, the 77.5-78 GHz segment is allocated to the amateur service and amateur-satellite service on a co-primary basis with the Government and non-Government radiolocation services.